

2022 Maidstone Lake & Tributary Water Quality Monitoring Results: Lay Monitoring Program and LaRosa Partnership Program

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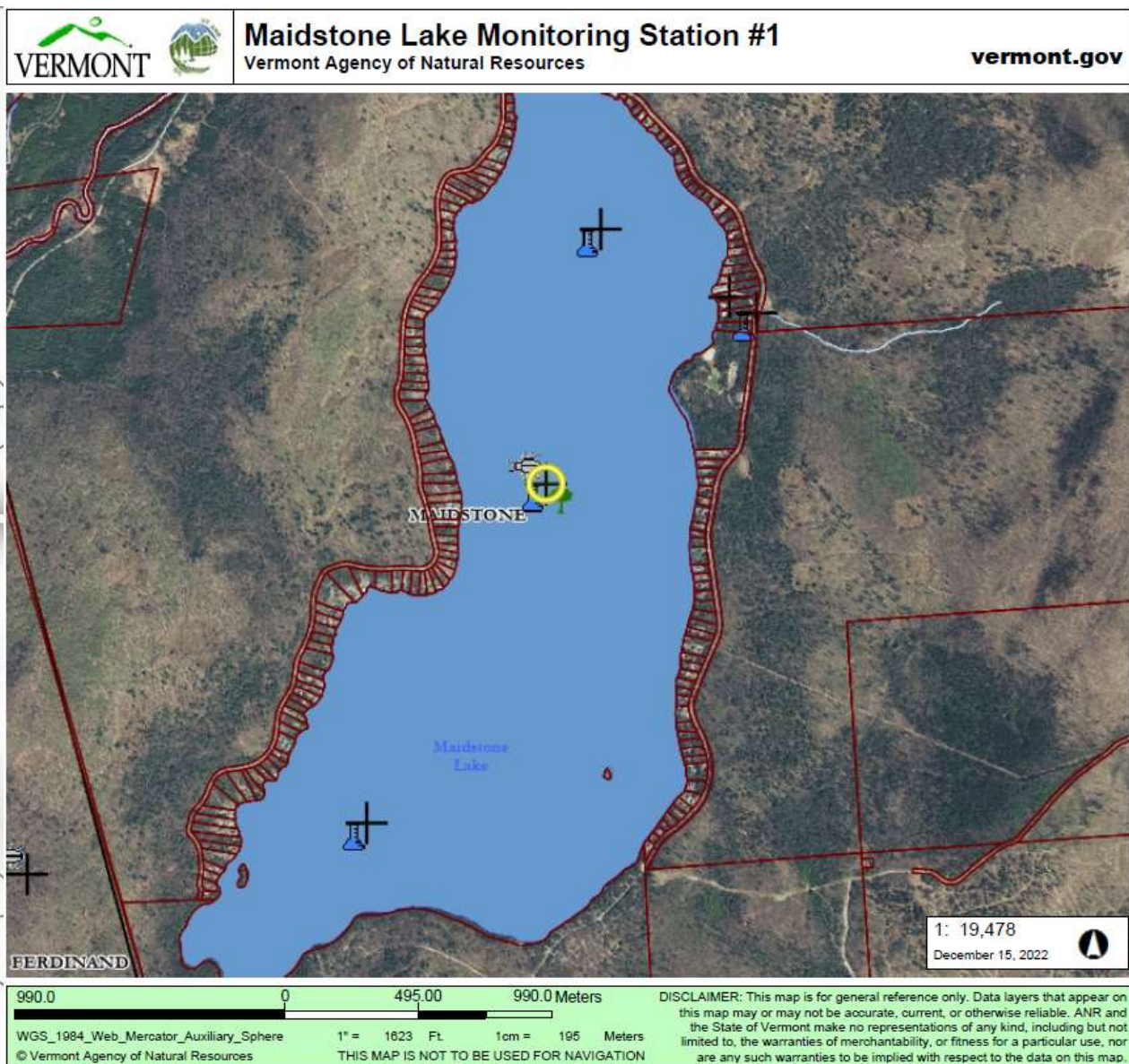
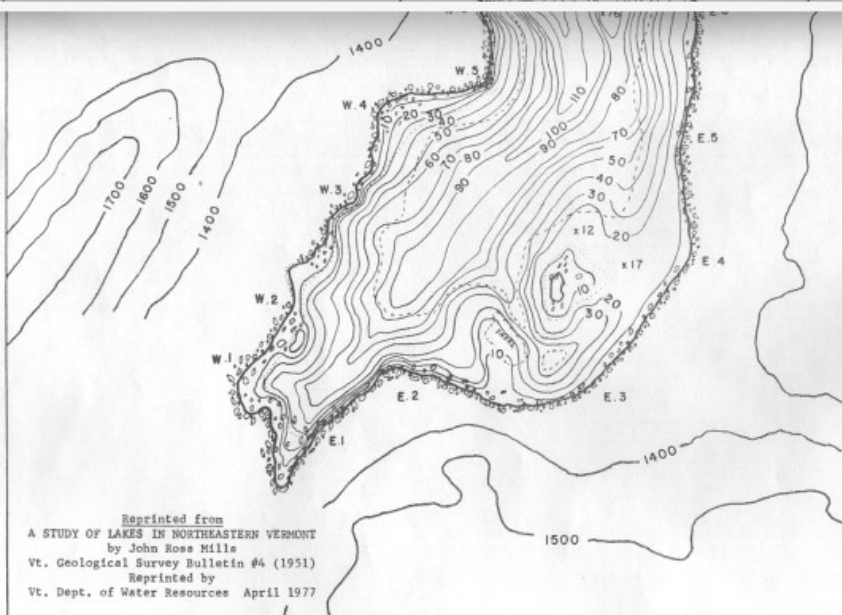
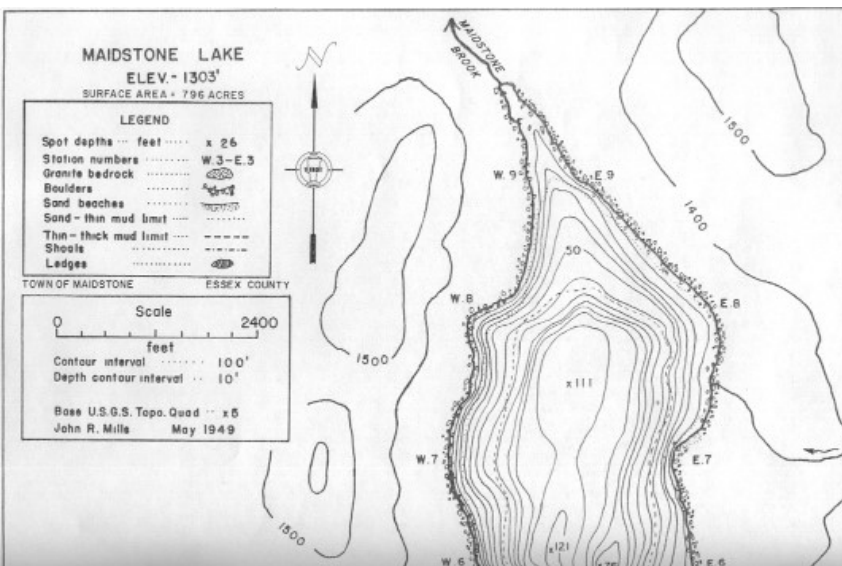


Lay Monitoring Program (LMP) Lake Sampling Overview

- Weekly from Memorial Day to Labor Day (minimum of 8 samples for summer mean):
 - *Basic Sampling*: Measure Secchi disk transparency depth (clarity)
 - *Supplemental Sampling*: Collect water samples with hose at twice Secchi depth that are lab tested for total phosphorus (nutrient) concentration and chlorophyll-a (algae) concentration
 - Complete a lake sampling webform (and report cyanobacteria conditions)



<https://dec.vermont.gov/watershed/lakes-ponds/monitor/lay-monitoring>



Vermont Lake Score Card

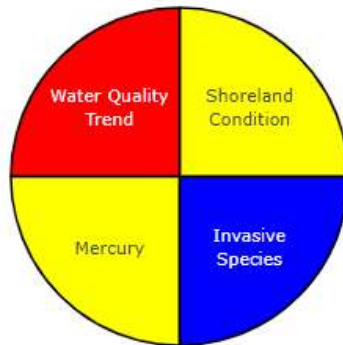
Maidstone Lake

<https://dec.vermont.gov/watershed/lakes-ponds/data-maps/scorecard>

Scores

Water Quality Data

Lake Information



Watershed: **Minimally Disturbed**

WQ Standards: **Stressed**

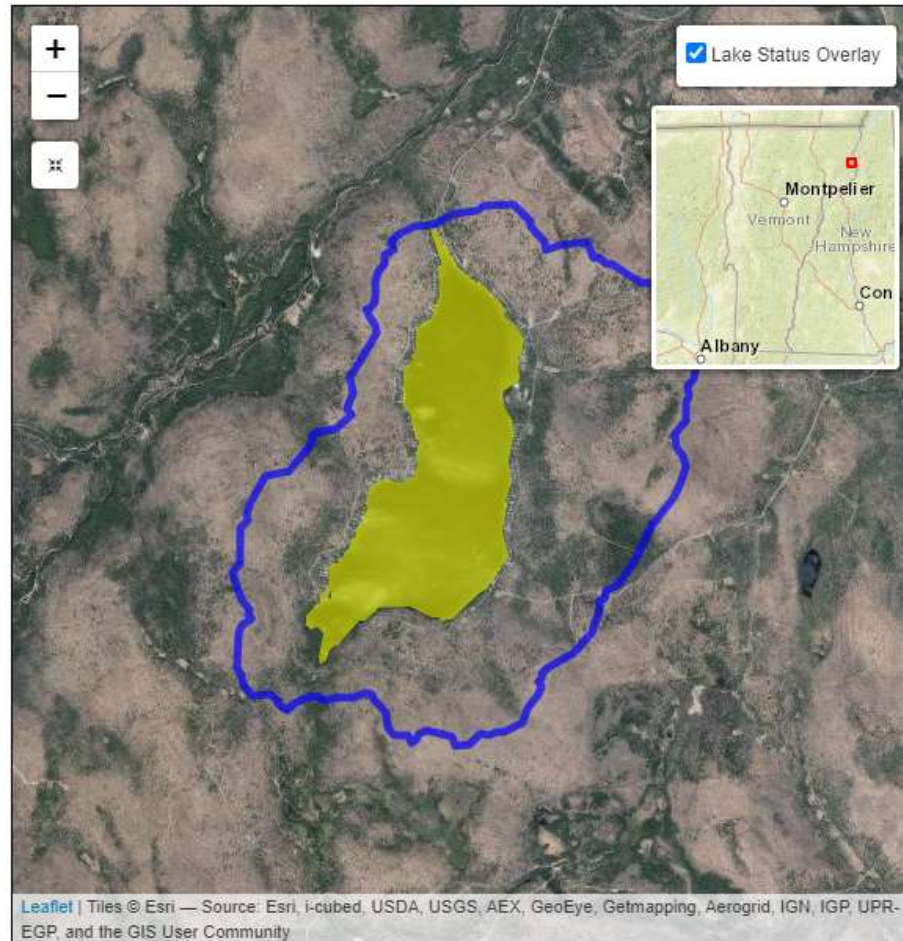
Details

Stressed – pH

Color Scoring System

- Good Conditions
- Fair Conditions
- Poor Conditions
- Insufficient Data

[Learn How Lakes Are Scored](#)



Vermont Lake Score Card

Maidstone Lake

Scores Water Quality Data Lake Information

Plots

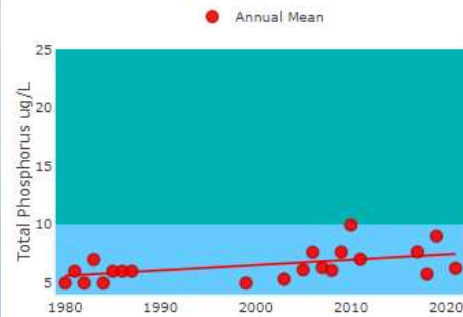
Trophic condition thresholds are indicated by shading:

■ Hypereutrophic ■ Eutrophic ■ Mesotrophic ■ Oligotrophic

Click on "Daily Mean" or "Annual Mean" to toggle on or off the data layer.

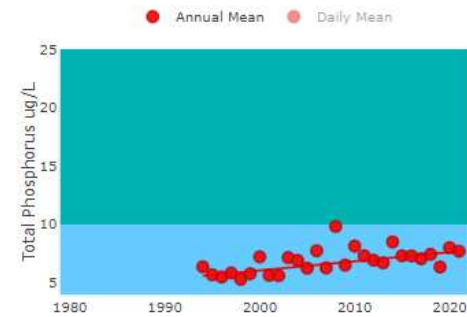
Spring Phosphorus

Trend: Highly Significantly Increasing (p-value=0.0023)



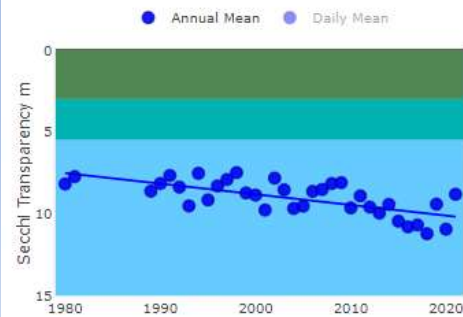
Summer Phosphorus

Trend: Highly Significantly Increasing (p-value=9e-04)



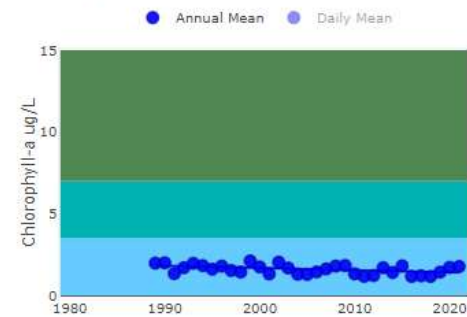
Summer Secchi

Trend: Highly Significantly Increasing (p-value=1e-04)



Summer Chlorophyll-a

Trend: Significantly Decreasing (p-value=0.0132)



Vermont Lake Score Card

Maidstone Lake

Scores Water Quality Data Lake Information

Plots

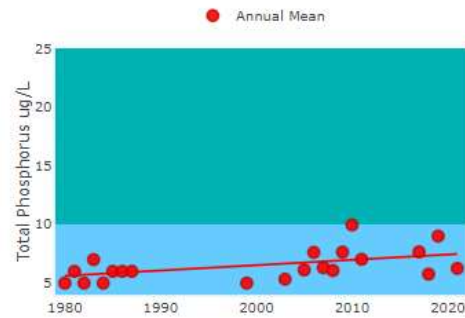
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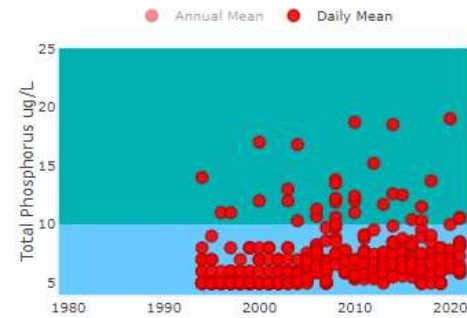
Spring Phosphorus

Trend: Highly Significantly Increasing (p-value=0.0023)



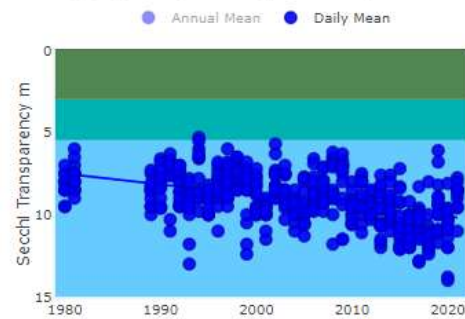
Summer Phosphorus

Trend: Highly Significantly Increasing (p-value=9e-04)



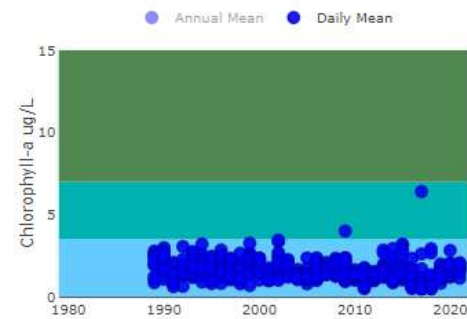
Summer Secchi

Trend: Highly Significantly Increasing (p-value=1e-04)

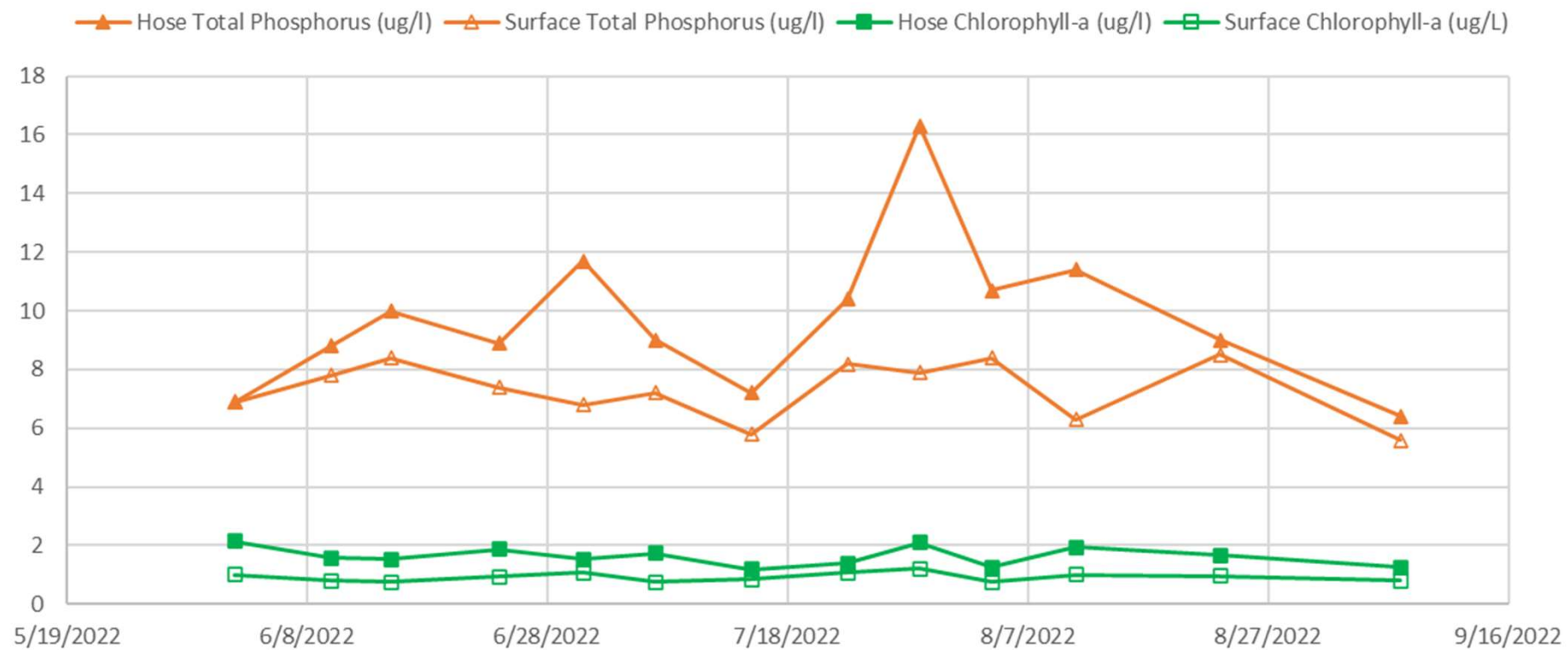


Summer Chlorophyll-a

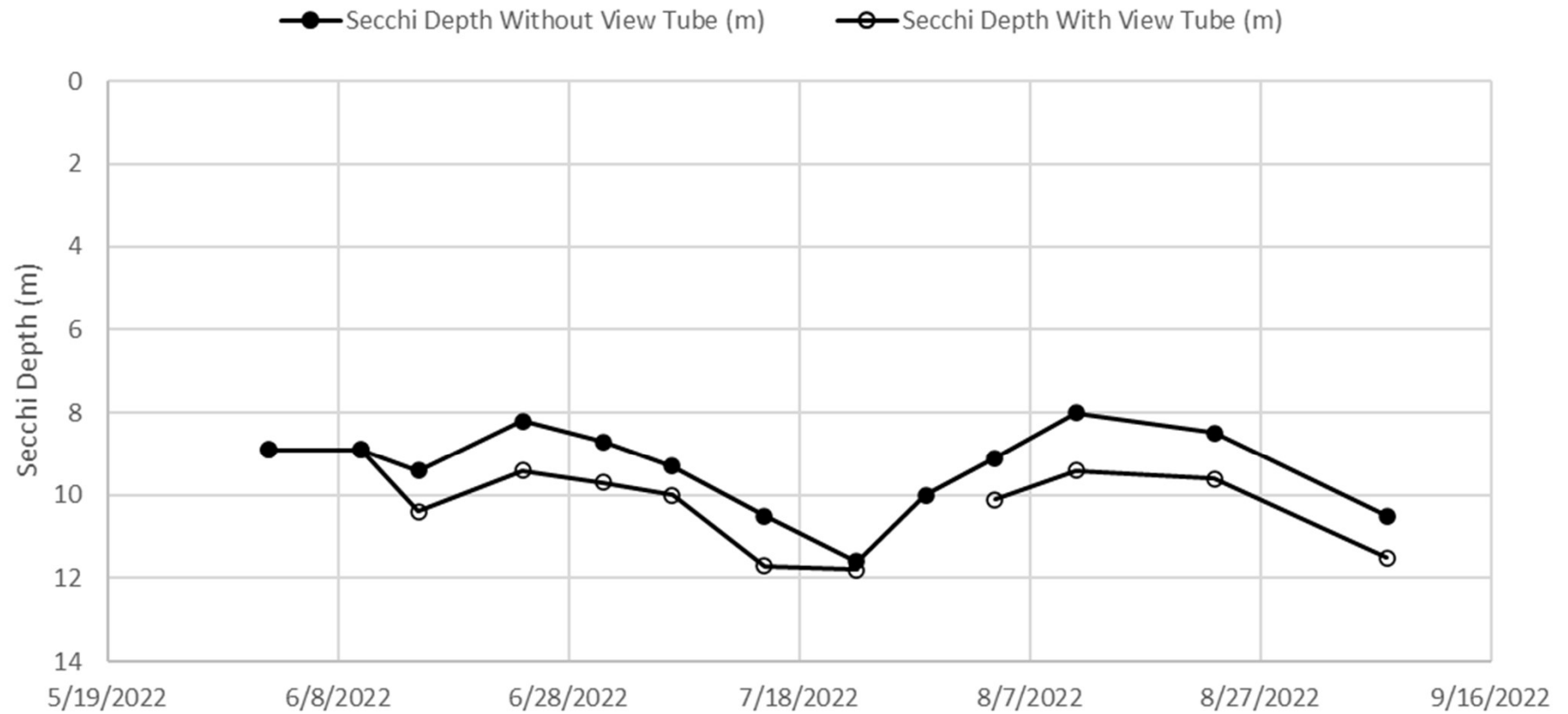
Trend: Significantly Decreasing (p-value=0.0132)



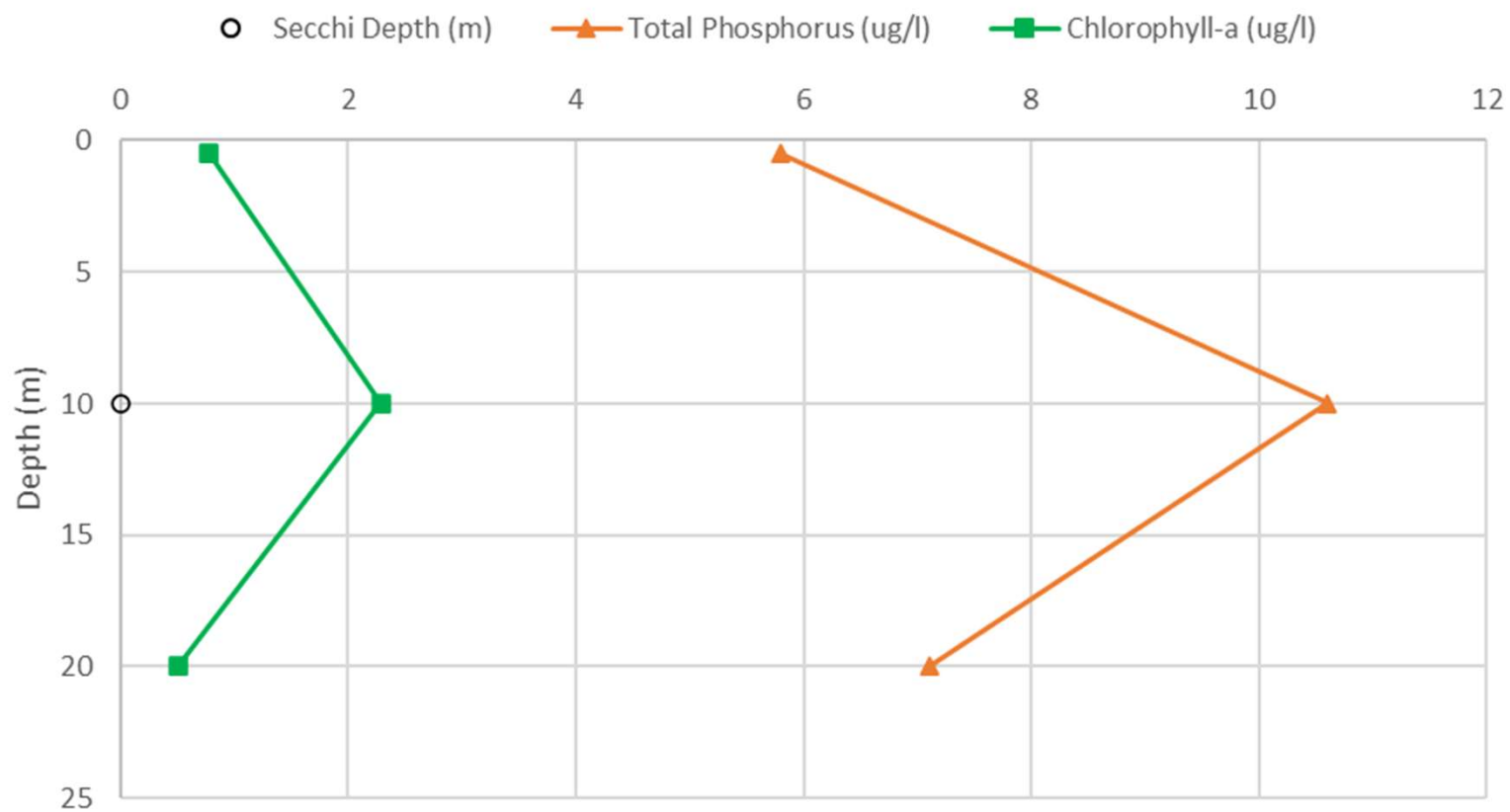
2022 Maidstone Lake Lay Monitoring Total Phosphorus & Chlorophyll-a Results



2022 Maidstone Lake Lay Monitoring Secchi Depth Results



Maidstone Lake Water Quality Vertical Profile on 8/23/2022



Sampling Date	Hose Sample Depth (m)	Hose Total Phosphorus (ug/l)	Surface Total Phosphorus (ug/l)	Hose Chlorophyll-a (ug/l)	Surface Chlorophyll-a (ug/L)	Secchi Depth Without View Tube (m)	Secchi Depth With View Tube (m)
6/2/2022	18	6.9	6.9	2.14	1.01	8.9	8.9
6/10/2022	17.8	8.8	7.8	1.57	0.8	8.9	8.9
6/15/2022	20	10	8.4	1.54	0.75	9.4	10.4
6/24/2022	20	8.9	7.4	1.88	0.93	8.2	9.4
7/1/2022	20	11.7	6.8	1.52	1.08	8.7	9.7
7/7/2022	20	9	7.2	1.73	0.76	9.3	10
7/15/2022	20	7.2	5.8	1.19	0.85	10.5	11.7
7/23/2022	20	10.4	8.2	1.39	1.08	11.6	11.8
7/29/2022	20	16.3	7.9	2.09	1.22	10	
8/4/2022	20	10.7	8.4	1.26	0.75	9.1	10.1
8/11/2022	20	11.4	6.3	1.95	1	8	9.4
8/23/2022	20	9	8.5	1.67	0.95	8.5	9.6
9/7/2022	20	6.4	5.6	1.26	0.79	10.5	11.5
Mean	19.7	9.7	7.3	1.6	0.9	9.4	10.1
VT Class A1 Standards	Photosynthetic Zone	12	12	2.6	2.6	5	5

MAIDSTONE LAKE

Annual Data (Station 1)

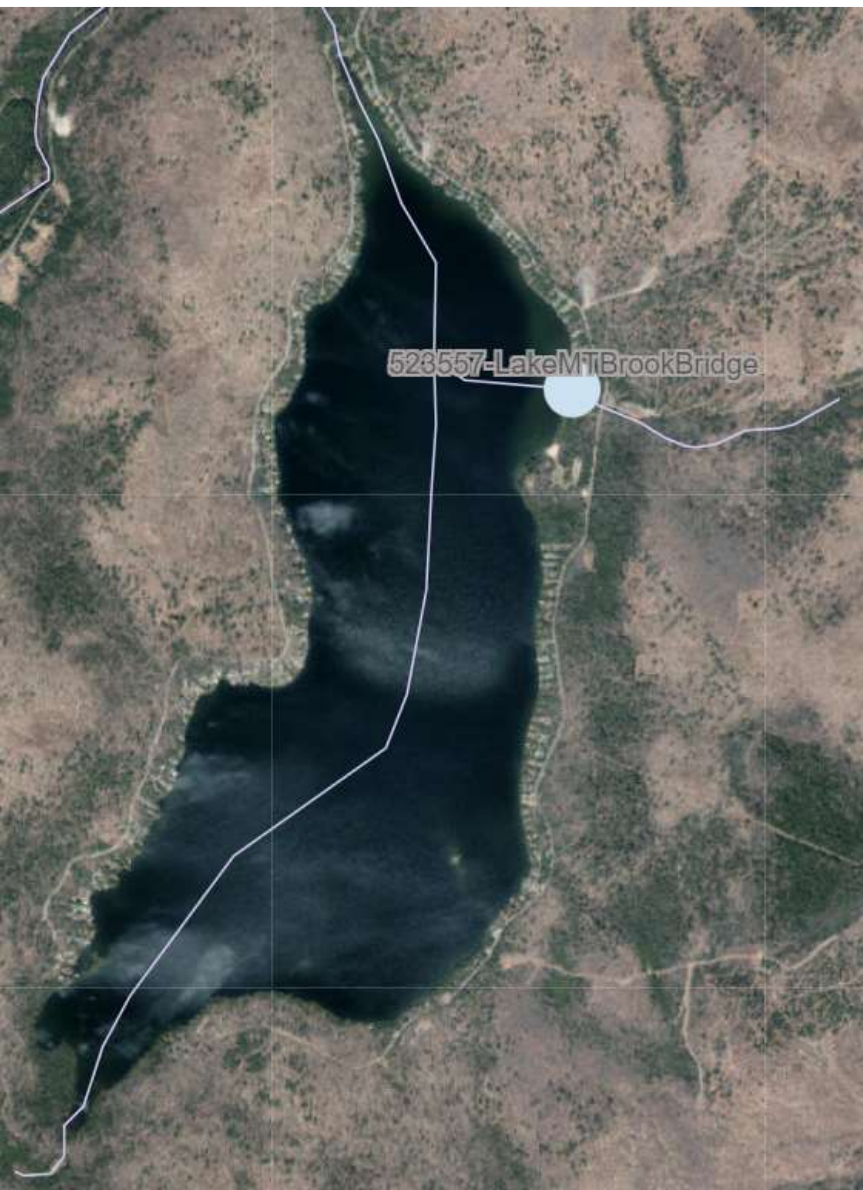
Year	Days Sampled	Secchi (m)	Secchi View Tube (m)	Chloro- a (µg/l)	Summer TP (µg/l)	Spring TP (µg/l)
1979	17	7.3				6.0
1980	14	8.2				4.0
1981	13	7.7				6.0
1982						4.0
1983						7.0
1984						5.0
1985						6.0
1986						6.0
1987						6.0
1989	11	8.6		2.0		
1990	14	8.2		2.0		
1991	13	7.7		1.3		
1992	13	8.4		1.7		
1993	14	9.5		2.0		
1994	13	7.5		1.8	6.2	
1995	13	9.2		1.6	5.6	
1996	14	8.3		1.8	4.6	
1997	14	7.9		1.5	5.4	
1998	13	7.5		1.4	4.9	
1999	14	8.7		2.1	5.5	4.3
2000	13	8.9		1.7	7.2	
VT Standard*		2.6		7.0	18.0	

* VT Water Quality Standards Nutrient Criteria for Class B2 Lakes > 20 acres.

Annual Data (Station 1)

Year	Days Sampled	Secchi (m)	Secchi View Tube (m)	Chloro- a (µg/l)	Summer TP (µg/l)	Spring TP (µg/l)
2001	14	9.8		1.3	5.4	
2002	14	7.8		2.0	5.6	
2003	12	8.5		1.7	7.2	5.3
2004	12	9.7		1.3	6.9	
2005	14	9.5		1.3	6.3	6.1
2006	13	8.6		1.4	7.7	7.6
2007	13	8.5		1.6	6.3	6.3
2008	13	8.2		1.8	9.8	6.1
2009	13	8.1		1.8	6.5	7.6
2010	14	9.6		1.3	8.2	10.0
2011	14	8.9		1.2	7.3	7.0
2012	14	9.6		1.2	6.9	
2013	15	10.0		1.7	6.7	
2014	15	9.4		1.4	8.5	
2015	16	10.5		1.8	7.3	
2016	14	10.8		1.2	7.3	
2017	15	10.7		1.2	7.1	7.7
2018	15	11.2		1.2	7.4	5.8
2019	14	9.4		1.4	6.4	9.0
2020	14	10.9		1.7	8.0	
2021	13	8.8		1.8	7.7	6.3
VT Standard*		2.6		7.0	18.0	

* VT Water Quality Standards Nutrient Criteria for Class B2 Lakes > 20 acres.



LaRosa Partnership Program (LPP) Tributary Sampling Overview

- LPP first sampled in 2022 ~biweekly from April to August + storm events
- 523557-LakeMTBrookBridge
 - Major tributary to Maidstone Lake

LPP Sample Parameters Overview

Total Phosphorus

- *Impacts*
 - Feeds plants, algae and cyanobacteria
 - Aquatic Biota, Aesthetics, Recreation Uses
- *Human Sources*
 - Runoff from roads, lawns, agriculture, logging
 - Malfunctioning septic systems
- *Vermont Water Quality Standards Nutrient Criteria for Aquatic Biota Use (+ Biological Criteria)*
 - Not to be exceeded at low median monthly flow (baseflow) during June through October
 - 12 ug/L for small high gradient streams (SHG)
 - 15 ug/L for medium high gradient streams (MHG)
 - 27 ug/L for warm-water medium gradient streams and rivers (WWMG)

Total Nitrogen

- *Impacts*
 - Feeds plants, algae and cyanobacteria
 - Aquatic Biota, Aesthetics, Recreation Uses
- *Human Sources*
 - Runoff from roads, lawns, agriculture, logging
 - Malfunctioning septic systems
- *Vermont Water Quality Standards*
 - Not to exceed 5.0 mg/l as NO₃-N at flows exceeding low median monthly flows, in Class B(1) and B(2) waters.
 - Not to exceed 2.0 mg/l as NO₃-N at flows exceeding low median monthly flows, in Class A(1) and A(2) waters at or below 2,500 feet elev.

Maidstone

Watershed

2,292 acres

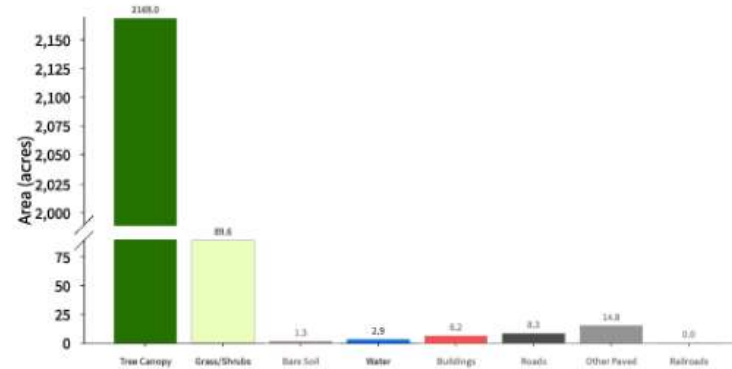
Base Land Cover Map



Source: Data Sources: 2001-06: High-Resolution (30m) and 2001-06: 1:250,000 Scale (30m) and 2001-06: 1:250,000 Scale (30m)

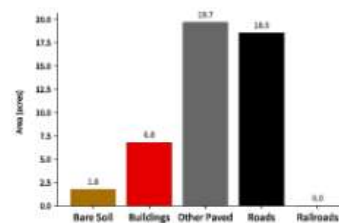
High-Resolution Land Cover Summary

Base Land Cover (Top-Down*)



Supplemental Land Cover

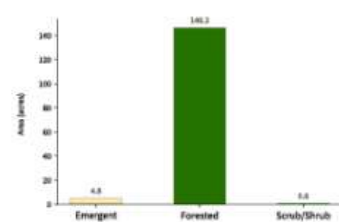
Impervious Surfaces (46.79 acres - 2 % of total) (Bottom-Up**)



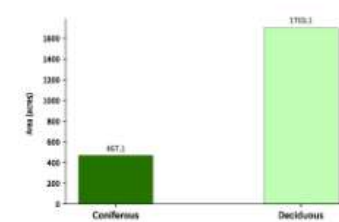
Agriculture (0 acres - 0 % of total)

No Agricultural Land Cover Mapped in this Area

Wetlands (151.71 acres - 6.6 % of total)



Tree Canopy (2,170.18 acres - 94.7 % of total)



*This figure is based on land cover mapping results. Land cover is mapped on the regional land cover data.

**This figure is based on land cover mapping results. Land cover is mapped on the regional land cover data. The regional land cover mapping of forest is independent of other factors.

Source: 2001-06: High-Resolution (30m) and 2001-06: 1:250,000 Scale (30m)

Maidstone

Tributary 100ft Buffer

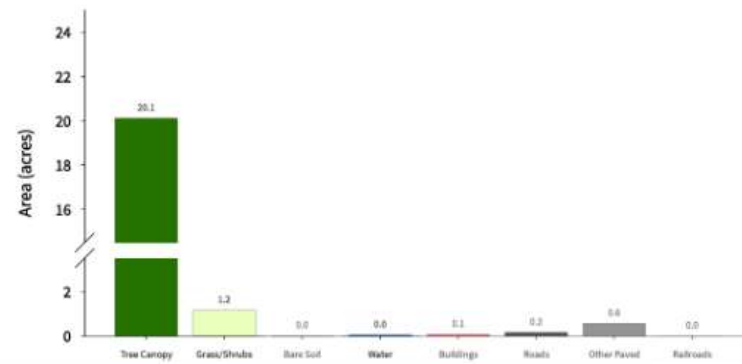
22 acres



Map data: Esri, DeLorme, Garmin, © OpenStreetMap contributors, CNR, USDA, National Geographic, Esri, DigitalGlobe, GeoEye, IGN, AerGRID, AeroGRID, IGN, Esri, Swire

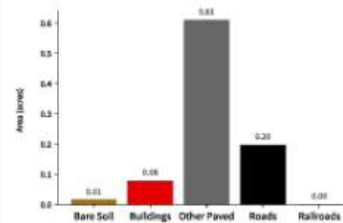
High-Resolution Land Cover Summary

Base Land Cover (Top-Down*)



Supplemental Land Cover

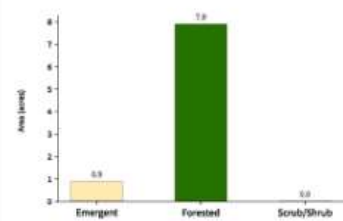
Impervious Surfaces (0.9 acres - 4.1 % of total) (Bottom-Up**)



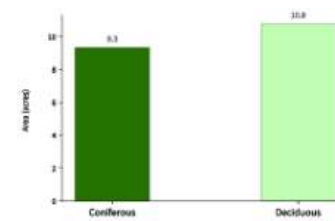
Agriculture (0 acres - 0 % of total)

No Agricultural Land Cover Mapped in this Area

Wetlands (8.78 acres - 39.9 % of total)

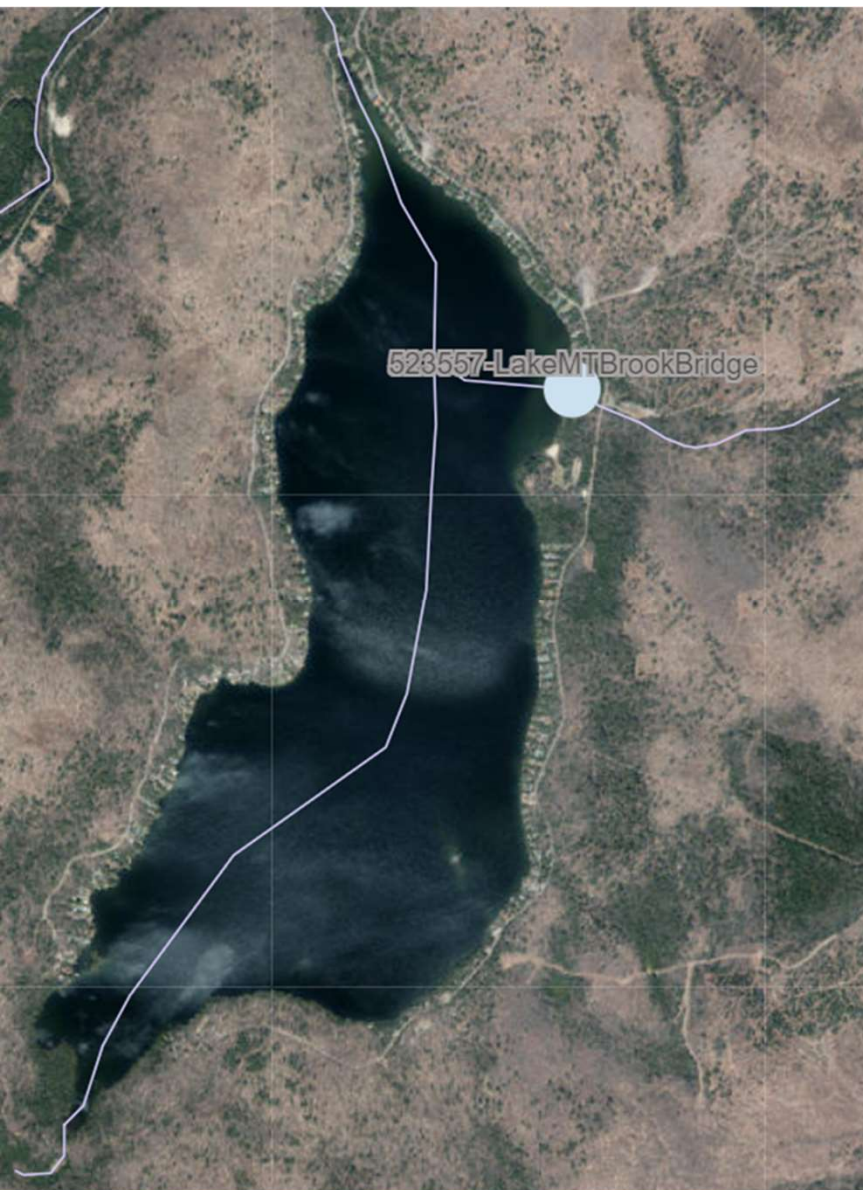


Tree Canopy (20.12 acres - 91.5 % of total)

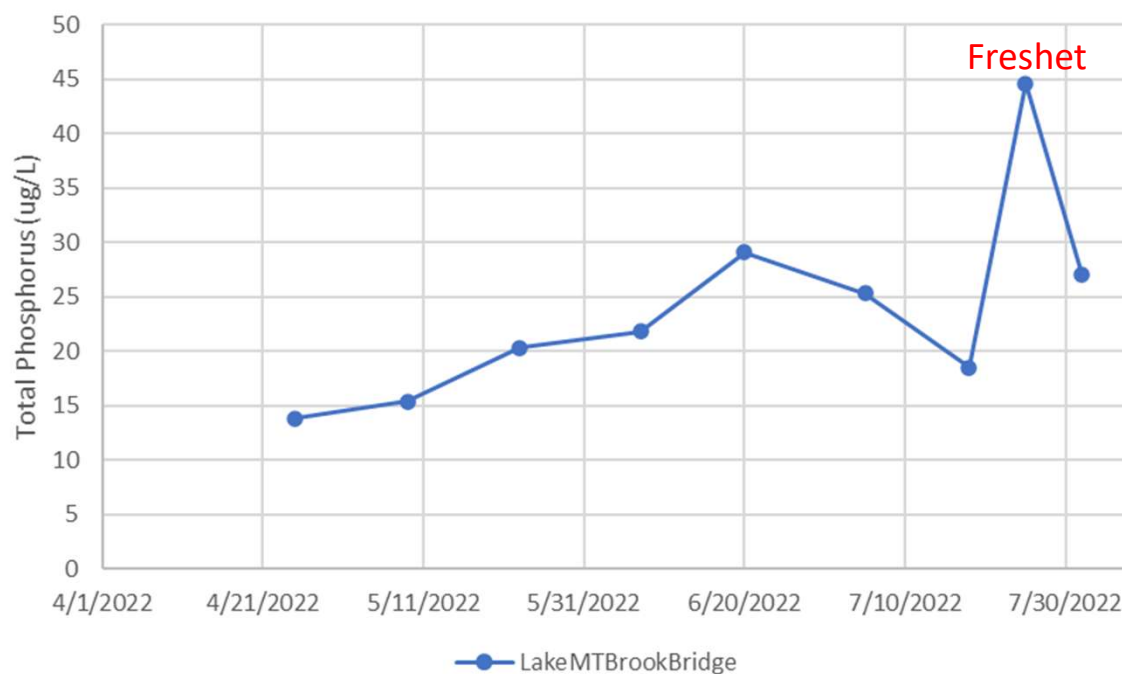


*This figure is a simplified representation of the land cover. Land cover is reported in the appropriate land cover class.

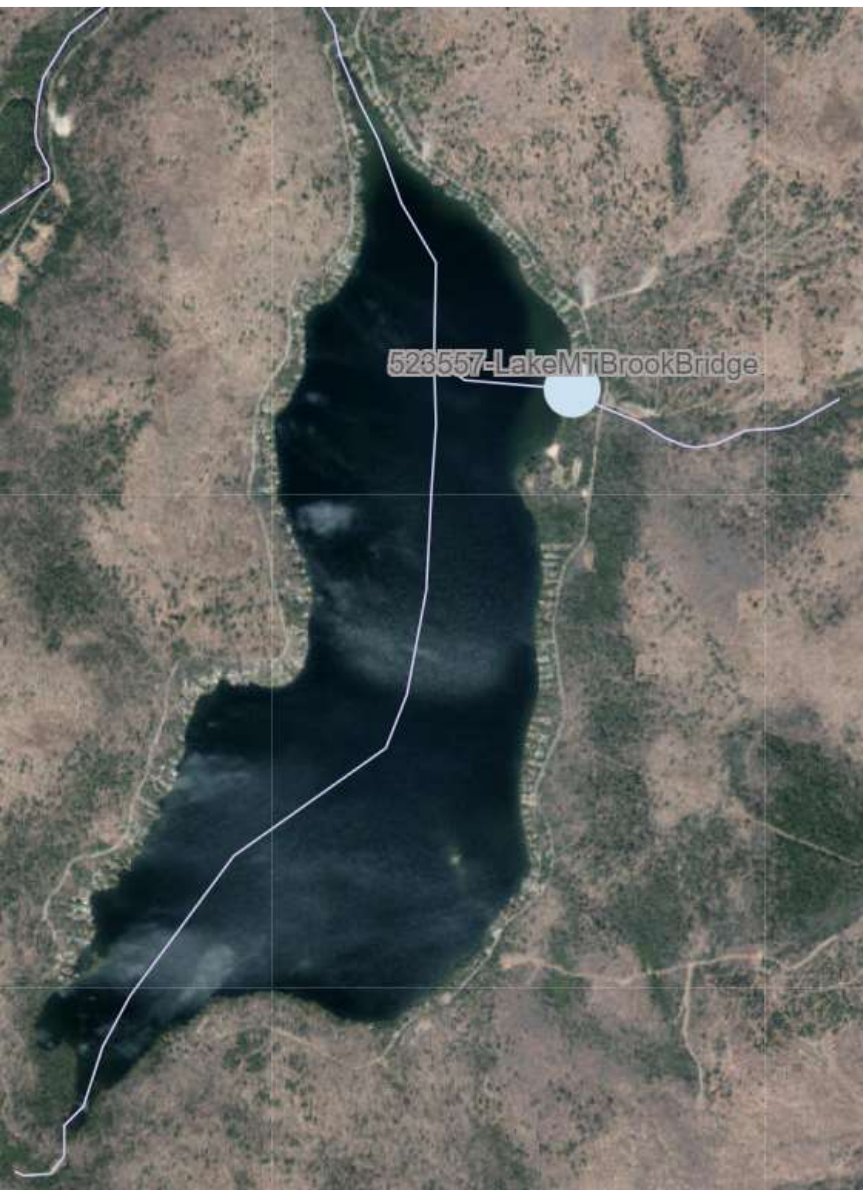
**Bottom-Up: A more detailed mapping approach. Land cover is reported in the appropriate land cover class. This approach results in more detailed mapping of features and percentages than the top-down approach.



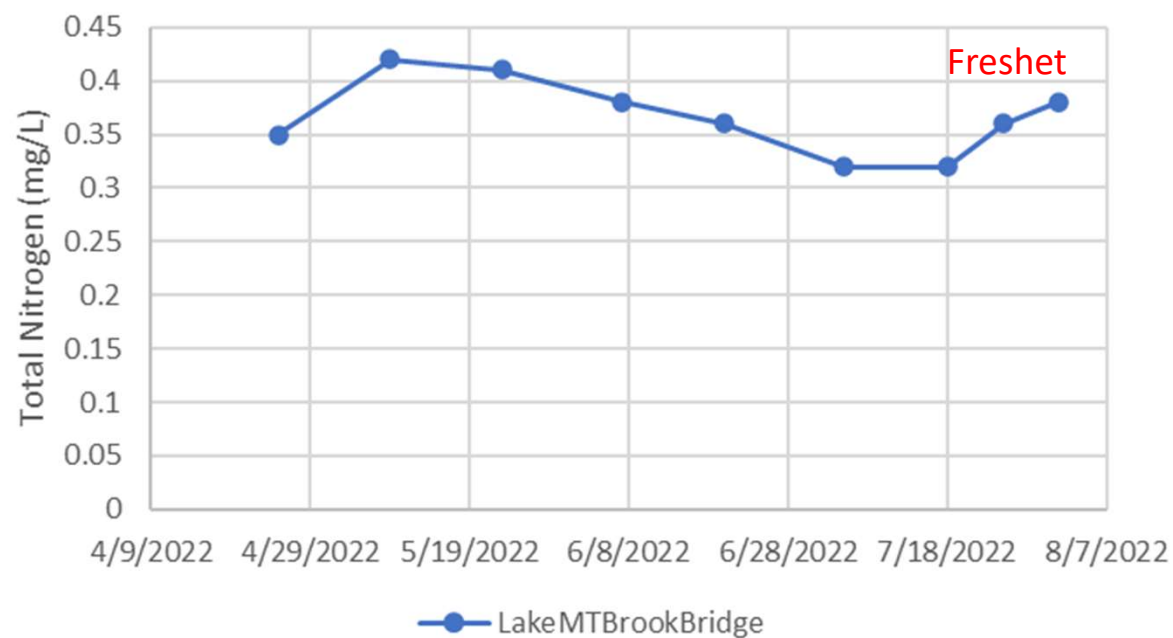
2022 Maidstone Lake Tributary Monitoring Total Phosphorus Results



Mean Total Phosphorus	(ug/L)	24.0
Minimum Total Phosphorus	(ug/L)	13.8
Maximum Total Phosphorus	(ug/L)	44.6

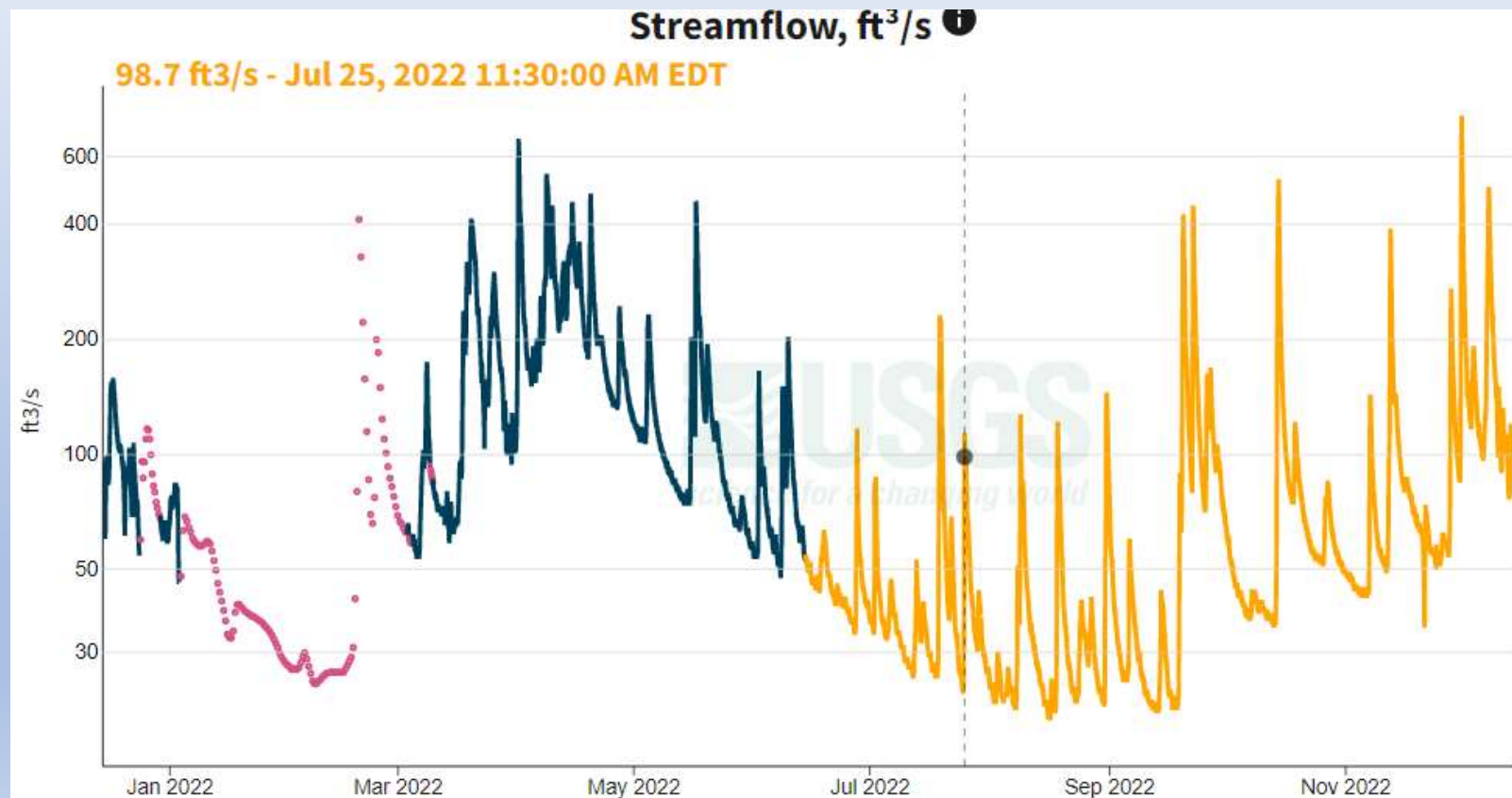


2022 Maidstone Lake Tributary Total Nitrogen Monitoring Results



Mean Total Nitrogen	(ug/L)	0.37
Minimum Total Nitrogen	(ug/L)	0.32
Maximum Total Nitrogen	(ug/L)	0.42

USGS Streamflow – E. Branch of Passumpic R.



2022 Monitoring Summary & 2023 Next Steps

- Lay Monitoring Program (LMP)
 - 2022 Summary: Hose samples have slightly higher total phosphorus concentrations than surface samples, but both correlate with Secchi and chl-a
 - 2023 Next Steps: LMP volunteer collects biweekly surface while LMP coordinator collects water quality vertical profile during visit; add caffeine testing as human wastewater indicator (i.e. septic systems)
- LaRosa Partnership Program (LPP)
 - 2022 Summary: LakeMTBrookBridge had increasing TP, 3X higher during freshet
 - 2023 Next Steps: LPP volunteer continues collecting biweekly samples through August and investigate tributary upstream for potential problem areas

